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Can memory-less network adapters benefit next-generation infiniband systems?

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Abstract

InfiniBand is emerging as a high-performance interconnect. It is gaining popularity because of its high performance and open standard. Recently, **PCI-Express**, which is the third generation high-performance I/O bus used to interconnect peripheral devices, has been released. The third generation of InfiniBand adapters allow applications to take advantage of **PCI-Express**. **PCI-Express** offers very low latency access of the host memory by network interface cards (NICs). Earlier generation InfiniBand adapters used to have an external DIMM attached as local NIC memory. This memory was used to store internal information. This memory increases the overall cost of the NIC. In this paper we design experiments, analyze the performance of various communication patterns and end applications on **PCI-Express** based systems, whose adapters can be chosen to run with or without local NIC memory. Our investigations reveal that on these systems, the memory fetch latency is the same for both local NIC memory and host memory. Under heavy I/O bus usage, the latency of a scatter operation increased only by 10% and only for message sizes 1B-4 KB. These memory-less adapters allow more efficient use of overall system memory and show practically no performance impact (less than 0.1%) for the NAS parallel benchmarks on 8 processes. These results indicate that memory-less network adapters can benefit next generation InfiniBand systems.

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0 L2

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L3 (PCI adj1 Express\$5) same transmit\$3 same receiver same value same bit

1 L3

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L2 (PCI adj1 Express\$5) near10 (mode near3 operation\$2)

0 L2

DB=PGPB,USPT,USOC; PLUR=YES; OP=OR

L1 (PCI adj1 Express\$5) near10 (mode near3 operation\$2)

2 L1

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L1 710/100,33,300-302,72,306,313;345/520,531;361/679,683,783;709/253;326/37.ccls. 10428 L1

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<u>L3</u>	11 and L2	11	<u>L3</u>
<u>L2</u>	(PCI adj1 Express) same mode	57	<u>L2</u>
<u>L1</u>	710/100,33,300-302,72,306,313;345/520,531;361/679,683,783;709/253;326/37.ccls.	10428	<u>L1</u>

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Terms	Documents
(PCI adj1 Express) same mode	5

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side by side

DB=EPAB,JPAB,DWPI,TDBD; PLUR=YES; OP=OR

L4 (PCI adj1 Express) same mode

DB=PGPB,USPT,USOC; PLUR=YES; OP=OR

L3 l1 and L2

L2 (PCI adj1 Express) same mode

L1 710/100,33,300-302,72,306,313;345/520,531;361/679,683,783;709/253;326/37.ccls.

Hit Count Set Name

result set

5 L4

11 L3

57 L2

10428 L1

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